NASA Astrobiology Academy

Ames Research Center

Program Description

and

2003 Activities - June 22 to August 29

Introduction

The NASA Astrobiology Academy is a unique summer institute of higher learning whose goal is to help guide future leaders of the U.S. Space Program. It provides research opportunities in state-of-the-art Astrobiology laboratories coupled with broad-based views into the inner workings of the space program. The success of the Space Program results from the interaction of government, academia, and the private sector, each playing a critical and different role in the 45-year-old civil program. Responsibilities overlap, leaders migrate from one sector to another and interdependence changes with each new administration.

NASA's Charter, written in the 1958 Space Act, gives it the main role of using and exploring space for the betterment of humankind. Congress and the President have both supported and restrained NASA as its programs have evolved. President John F. Kennedy's vision of putting a man on the moon within the decade included much more than the Apollo spectacular of newspaper fame. After Apollo's success, NASA has constantly sought to redefine its goals and fine tune its schedule every year seeking a budget to match its imagination. We have explored most of the planets, measured the solar system, flown humans in long term endurance missions and short term operational missions, invented new technology and trained Congress, teachers, students, businesspeople, and engineers, developing a whole new generation familiar with the expertise of the "Space Age."

The NASA Ames Research Center

The Ames Research Center (ARC), located at Moffett Field, California, in the heart of Silicon Valley, specializes in revealing new knowledge about the universe, planetary systems, and life and in creating new technologies that enable exciting new ventures in aeronautics and space exploration. Throughout its history, results from Ames research have significantly influenced national and international policy, enabled most of the major space missions of the past twenty years, and contributed science discoveries and engineering insights that have rewritten the textbooks. In the process of these endeavors, Ames has made numerous contributions to environmental protection, public health, and the nations economic well being.

Ames is unique in having world class ground, airborne, and space flight research capabilities in aeronautics, astrophysics, earth sciences, exobiology, fluid dynamics, gravitational biology, thermal protection technology, computational chemistry, planetary atmospheres, space laboratories, information sciences, and spacecraft life support.

As a result, Ames is the only NASA center to support all NASA Strategic Enterprises and acts as technical bridge to transfer skill, knowledge and technologies among the NASA Enterprises. This multidisciplinary synergy has created the world's only capability for the comprehensive study of Astrobiology -- life's origin, evolution, and distribution in the universe and destiny, from the protection of our planet to the evolution of terrestrial life into space.

Ames is the lead NASA Center for Astrobiology and is also the lead NASA Center for understanding the effects of gravity on living things. Ames plays a major role in understanding the origin, evolution, and distribution of stars, planets, and life in the universe. One important activity is Ames' unique research in atmosphere and ecosystems science in support of Mission to Planet Earth and the protection of the global environment. In space technologies Ames is also the lead center in providing the thermal protection systems that are critical for future access to space and planetary atmospheric entry vehicles.

Ames is NASA's Center of Excellence in Information Systems technologies, encompassing research in supercomputing, networking, numerical computing software, artificial intelligence, and human factors to enable bold advances in aeronautics and space.

In aeronautics, Ames is the agency lead center in airspace operations systems, including air traffic control and human factors, and the lead center for rotorcraft technology. Ames also has major responsibilities in the creation of design and development process tools and in wind tunnel testing.

About 1800 civil servants and over 2500 contractor personnel are employed at Ames. In addition, Ames is proud to host more than 500 graduate students, cooperative education students, post-doctoral fellows and university faculty members who work in

collaboration with Ames' preeminent scientists and technologists.

Ames is a pioneer in the application of the multidisciplinary approach in science, technology, and projects. That is, combining the perspectives, training, and technologies of a variety of discipline experts to attack problems of exceptional difficulty. Multidisciplinary approaches are flexible and tend to stimulate cutting edge concepts. Successful application of this technique requires a deep appreciation for the talents, skills, and insights of others and ability to cross-organizational lines to reveal hidden treasures of understanding. Today, more and more scientists and high tech industries are using this approach with remarkable results.

It is in this spirit of shared discovery and the synthesis of diverse talents that Ames offers the Astrobiology Academy. Students will contribute to every aspect of successful multidisciplinary research on Earth, in the air, and in space, from the formulation of an idea to the procurement of goods and services necessary to develop it, through the management, marketing, and manufacturing necessary to turn a concept into a reality.

The Astrobiology Academy

One goal of the Academy is to provide insight into all of the elements that make the NASA missions possible, while at the same time assigning the student to one of our best researchers to contribute toward one of our missions. Each student will be hand picked by a series of gates -- panels, interviews, etc., starting with their own State Space Grant Consortium who has selected and agreed to sponsor them. The Ames researchers have offered to mentor students. Over the past six years, the PIs have demonstrated leadership and have provided a very exciting environment for the students. The Academy program is also recognized for providing excellent students to each of these PIs for summer activities. The "match" between student (Research Associate) and researcher (Principal Investigator) is done by mutual selection.

The Academy is an intense summer experience with little free time. Opportunities for learning come in many forms and at all hours of the day and night. forty Percent of the student's time will be spent as a "group" or a "team" working on projects, listening to and debating lectures, and traveling together. These avenues help to develop the leadership, teamwork, and critical thinking skills that are important to our nation's future in space. In addition to the rich intellectual environment, students will be assigned to a Principal Investigator to work independently on a technical project. The mentor relationship that evolves gives the RA's insight into the trials and rewards of primary scientific research. Approximately 60% of the traditional workweek is dedicated towards this aspect of the Academy.

The final part of the Academy experience results from the exposure to NASA's greater organization. A formal lecture series focusing on all the various aspects of Astrobiology is coordinated with informal dinners with some of NASA's top scientists. There is also considerable time spent on travel to various facilities allowing students to learn about and network with leaders in aerospace, high-tech, genetic engineering companies as well as local, state, and national political decision makers. In summary, the Academy is a jam-packed summer experience, which provides all the tools to guide the future leaders of America's space program.

Activities -- June 22 to August 29

These dates were selected to give most students a breather before returning to school. These dates reflect the quarter system in colleges, since you are housed at Stanford and Stanford is on the quarter system. We know this is a compromise, as no two schools have identical schedules. **It is important that you all begin together and all end together**. The success of this Academy depends not on us as much as all of the students**. We do not accept people who are not able to attend this entire period. All students must be U.S. citizens or hold a "green card."**

Our intention is to assure that the students interact as a "team." We will always try to spark your leadership qualities.

While we encourage the students to stay together as much as possible; we do not want you to feel trapped. All students will be housed at Stanford University with access to mass transit.

We plan several trips on the weekends. These include trips to the Jet Propulsion Laboratories, to the Desert Research Institute in Nevada, to Lawrence Livermore Laboratories, to the Dryden Flight Research Center, to Vandenburg Air Force Base and to other areas of interest in the West. The selected students will plan other weekend trips when they arrive.

Each of the ten weeks will be a unique group experience, but at the same time the student will be working on a research project with Investigators in the Ames laboratories or on our flight projects. Every morning at 7:30 we have breakfast together and the RA's hold a meeting on the group project. at Ames. Then work starts at 8:30 a.m. Lunch is at Ames, and dinner can be back at the student housing or at local eateries.

The Astrobiology Academy Experience

This past summer 13 students, interested in life, space, or Earth sciences, space technology, or space engineering coming from all over the U.S., were selected for the 10 week session to share a unique

experience resulting from their own ingenuity and free spirit. This coming summer we expect to host 12 students.

Our goal is to 'guide' not to instruct. Teaching and learning are not the same. Teaching is the orthodoxy of our universities and colleges; learning is the "ah-ha!" process of finding out and understanding. That is our objective: to foster curiosity, to spirit endeavor, and to inspire leadership.

All of these elements make the Astrobiology Academy a unique experience. All that is missing are the unique individuals who can synthesize these elements into a meaningful education.